

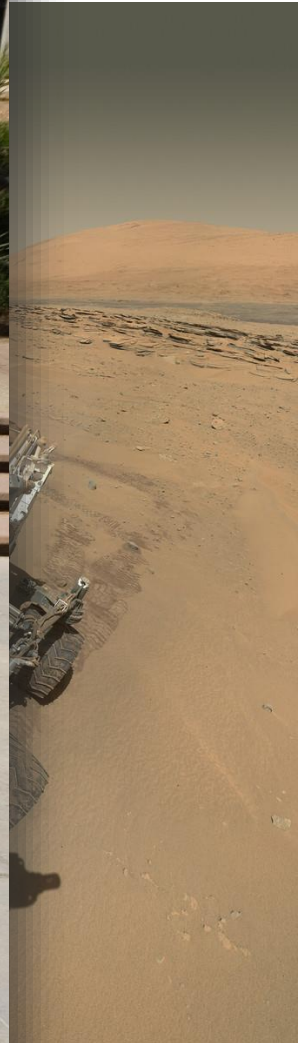
The Journey to the Clouds at NASA's Jet Propulsion Laboratory

Shaping and Salvaging Team Dynamics

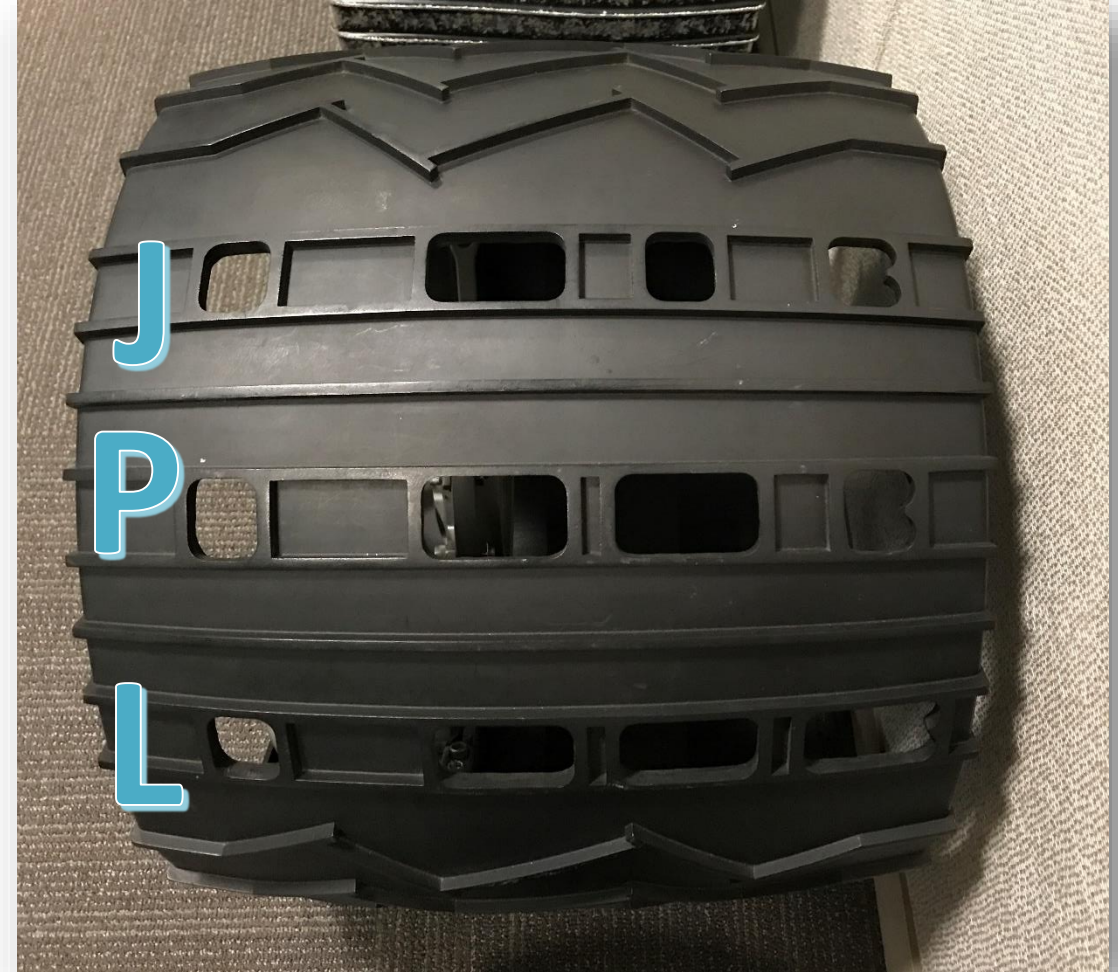
Michael Stefanini

Jet Propulsion Laboratory, California Institute of Technology.

- We are a leading center for developing and testing technologies by Caltech
- We are a leading center for developing and testing technologies by Caltech
- We have
 - 17 spacecraft
 - 10 instruments
- We manage the Mars Science Laboratory Network
- We “Dare to Dream”



Mars Science Laboratory Wheel Designs



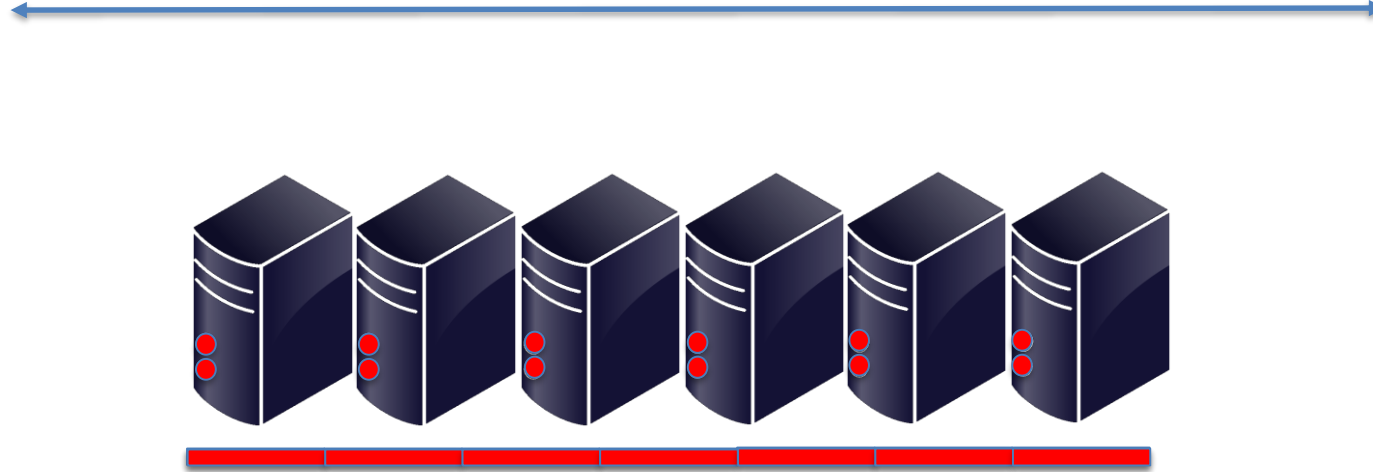
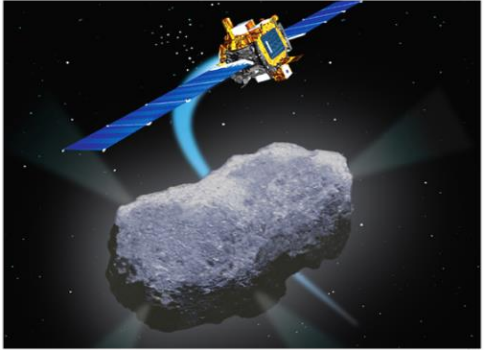
PMO at JPL

- IT at JPL consists of over 580 people
- We manage an average of 100 concurrent projects
- We coordinate the FFRDC PPMO Working group
- Main Goal: Provides decisional and actionable metrics to IT Leadership

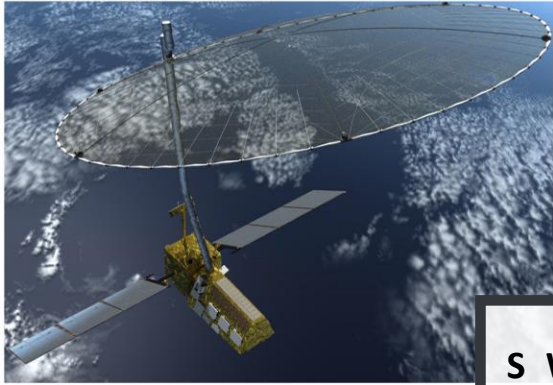
Our PMO is the Air Traffic Controller for the CIO's Office



The Goal: Cloud Computing for Spacecraft



The Goal: Cloud Computing for Spacecraft



S W O T &
N I S A R
2021

S M A P
2015

O C O - 2
2009

Over 100X More Data

OCT 25 2016

Jason-3

How do we protect
Our Earth?

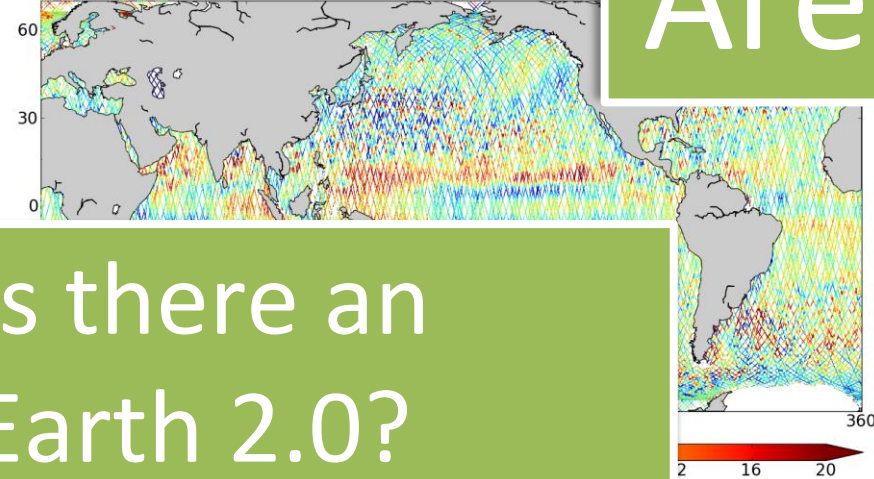
Was there life
on Mars?

Are we alone?

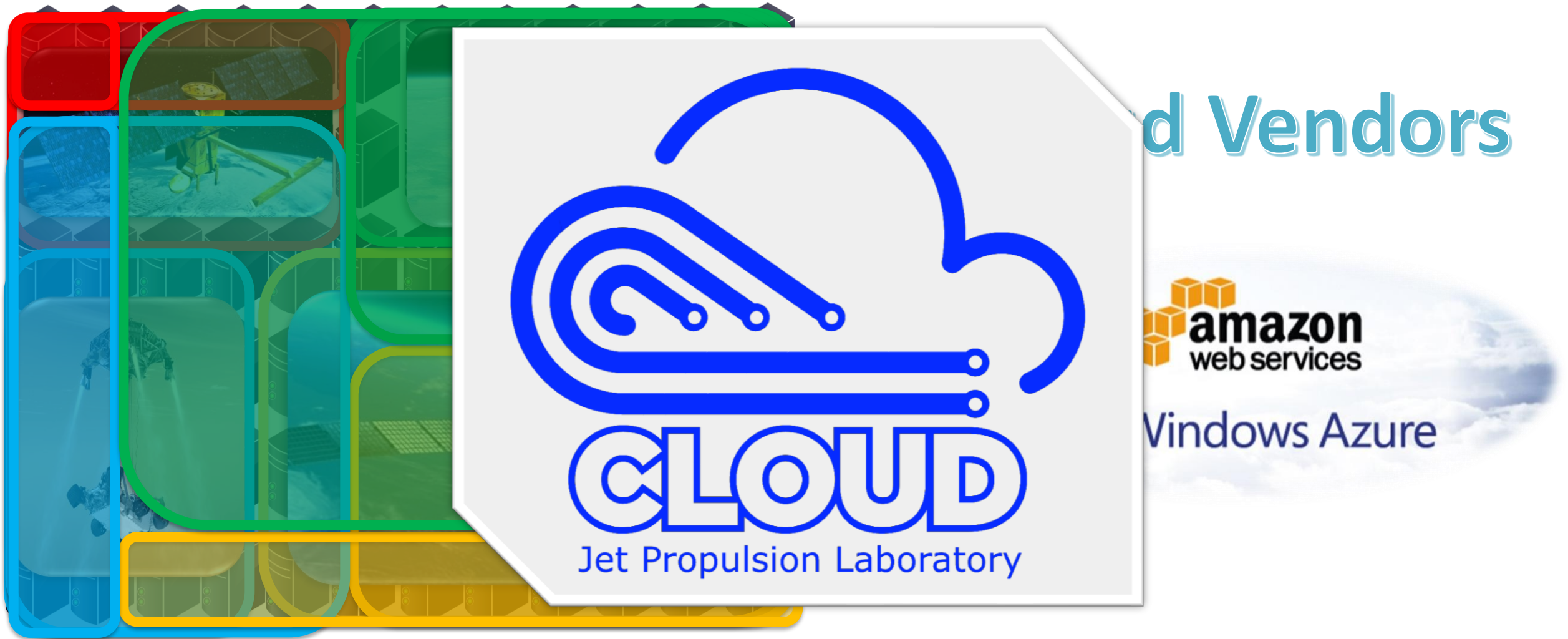
Is there an
Earth 2.0?

How can we reach
other Solar Systems?

Sea Surface Height Anomaly: SARAL, Jason-2 and Jason-3 Measurements



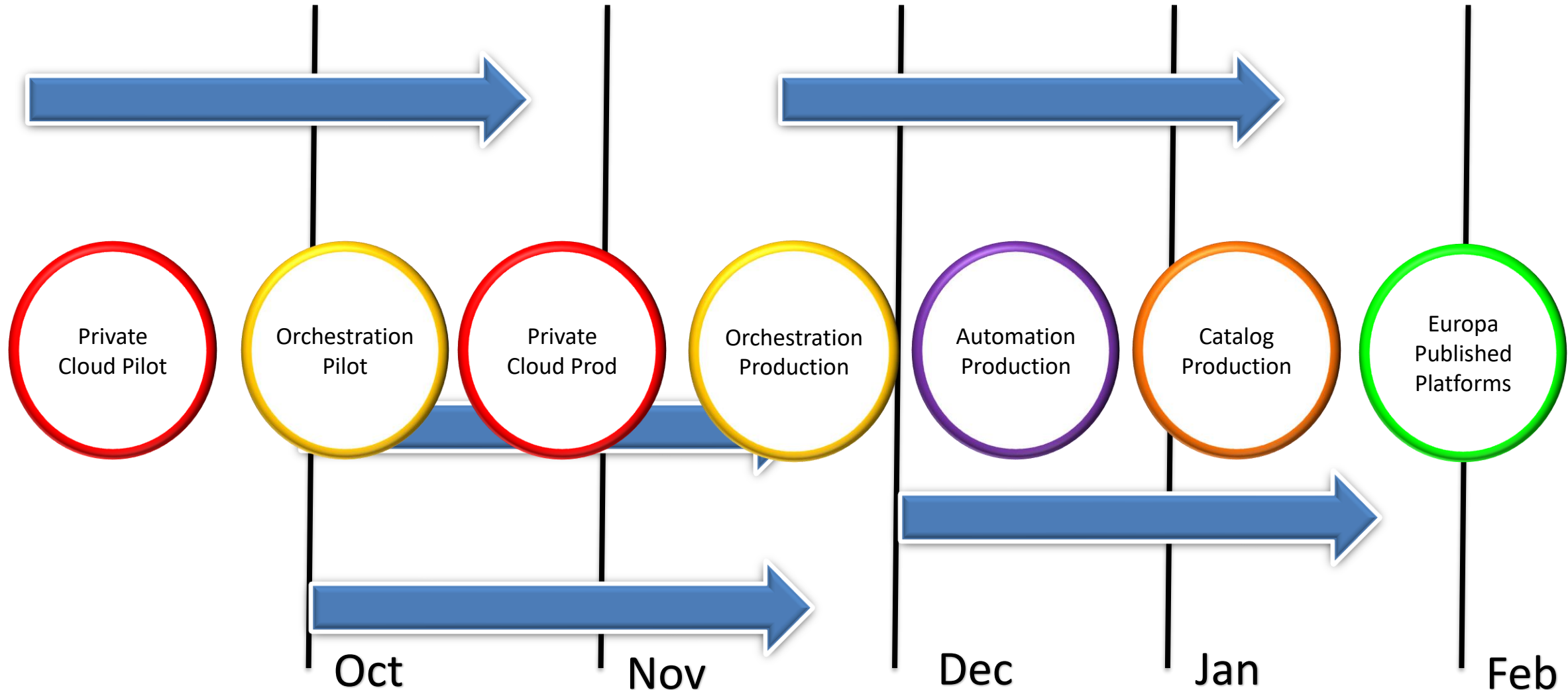
The Journey: A Hybrid Cloud



The Journey: A Hybrid Cloud



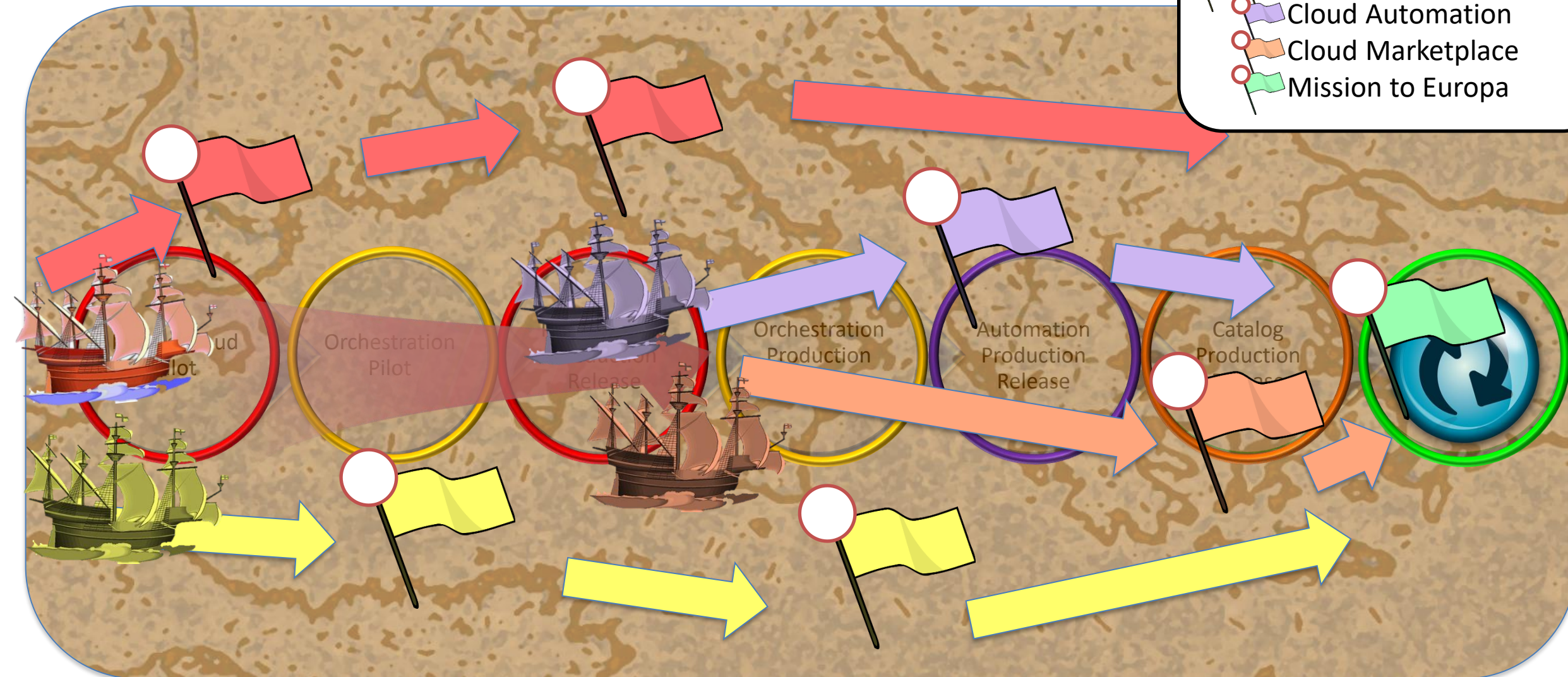
Preliminary Schedule:2015-2016



The Mission: Team R

Hybrid Cloud Program

-  Private Cloud
-  Orchestration
-  Cloud Automation
-  Cloud Marketplace
-  Mission to Europa



The Initial Preparation:



Challenge 1:

*Form a Team and
Survive the Night*

The Quest for Identity

- Some Assembly Required:
 - Pulled from many organizations with differing priorities
- Build Team Dynamics and a Team Culture
 - Form Habits and Customs quickly
 - Enforce expectations Early and Consistently
 - Develop and employ Ritual and Ceremony
 - Project Logos and Branding
 - Engage Team Member's Management



The Quest for Identity

- Tie into existing Processes
 - Sprint Starts and Closes; Daily Scrum
 - Reinforce Recognition from Other Team Members
 - Schedule Progress Updates; Stand-Up Meetings
 - Shared Project Goals tied to project Velocity
 - Full Transparency from the top
 - The Projects are Loosely Coupled but the teams Celebrate Together
 - Project Delivery Lunches and Holiday Parties – With Families!



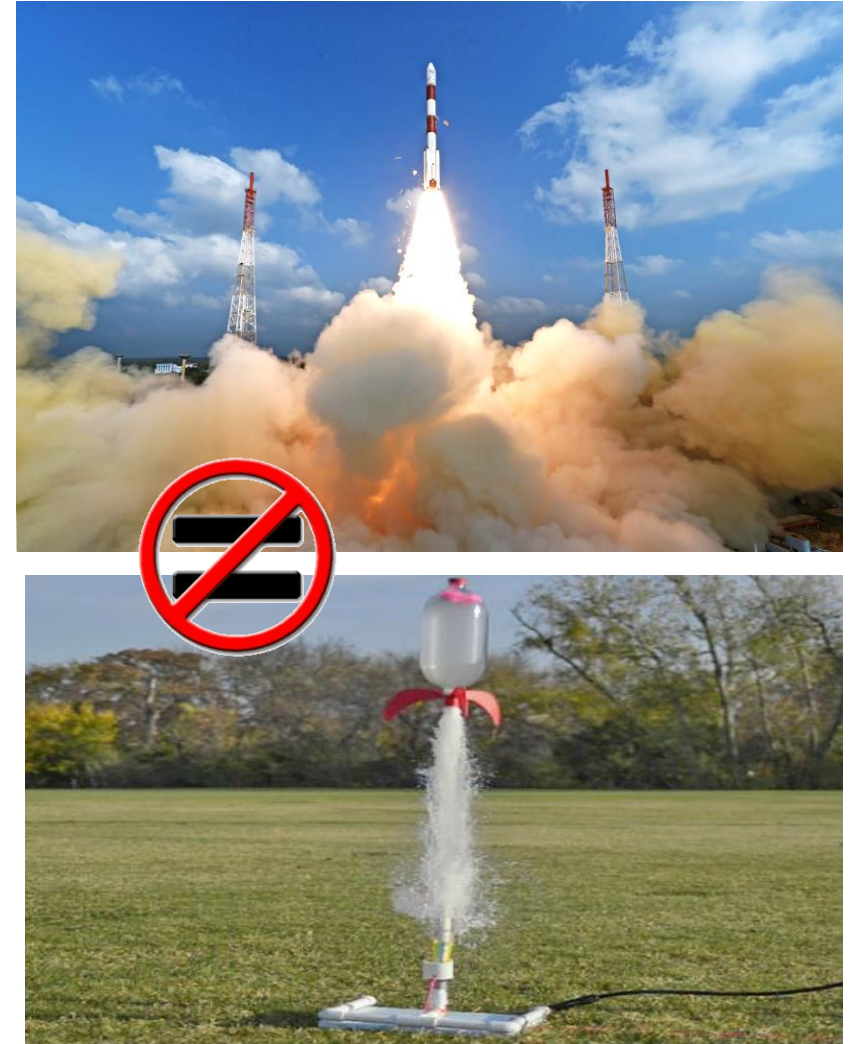
The Initial Preparation:



Time and Space

The project was communicated as a Top Executive Priority

This contrasted with the lack of any resources – even a physical meeting room

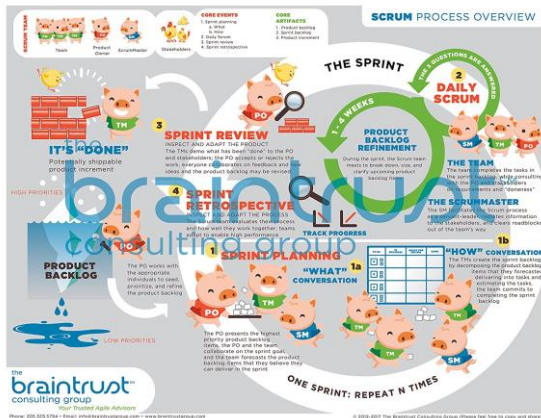


Establishing the HQ

- Turning our issue into an opportunity:
 - Priority status allowed operation “outside the box”
 - Literally converted old storage rooms
 - Work Party was held to clean, assemble furniture, and set up
 - Partnered with Technology and Innovation Team as a Showcase
 - Built “Conference-Room-in-a-Box” for under \$1000
 - Team areas and meetings were built with ~~mobility~~ agility first



Stocking the HQ



The Initial Preparation:

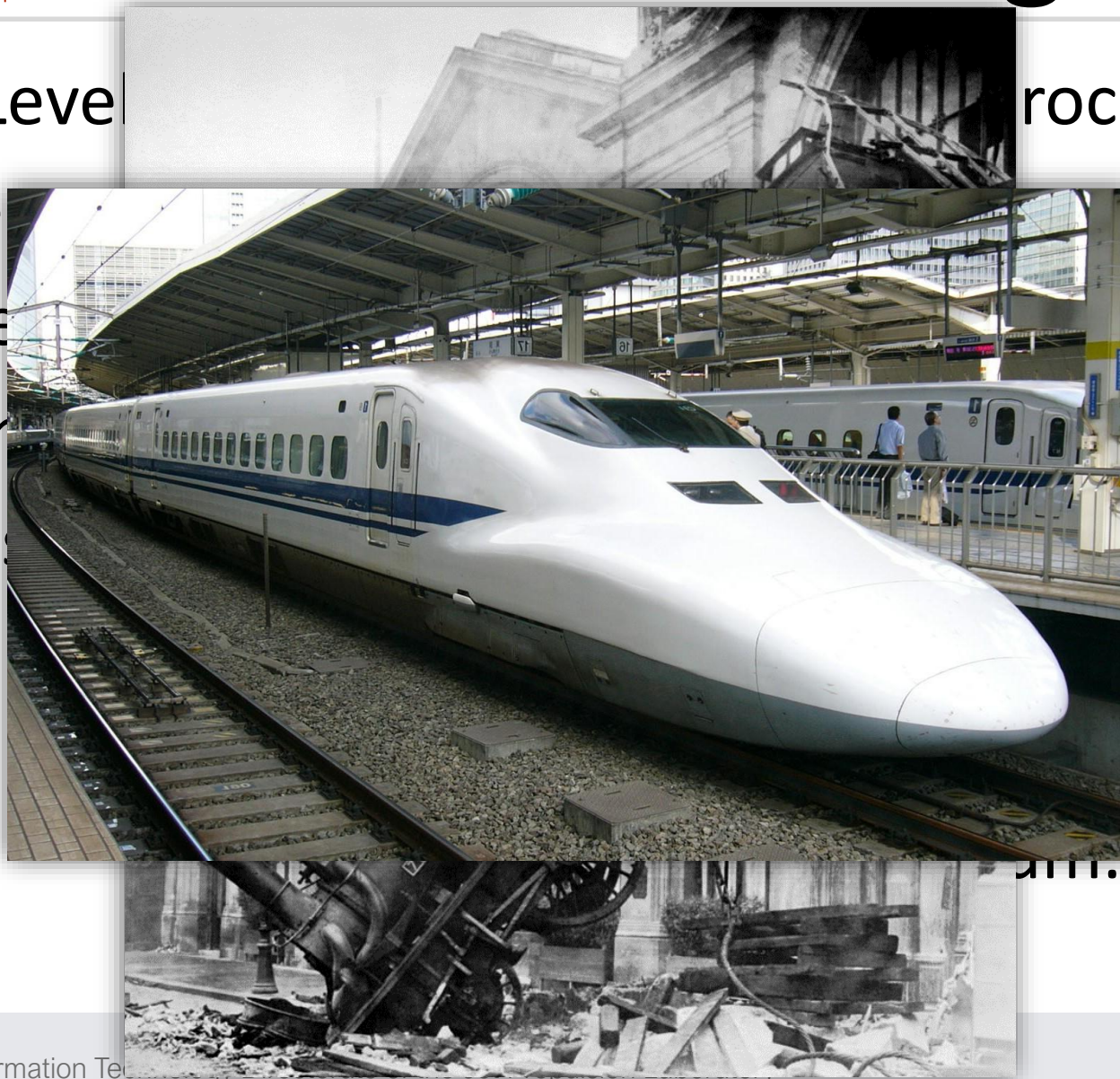


Challenge 3:

*Prepping for
Adversity*

Fast or Agile?

- Failure to Level processes
 - Lax adherence
 - Assuming e
 - Team was r
- Things
- re ways.
- ing to change
- am.
- **Agility** is



Starting Processes Right

- Provide Basic Training as a Review/Refresher for the team
- Keep Weekly Retrospectives
 - Retrospectives on Waterfall Projects
- Have Team Members Provide their Own Status Reports by Standing in the Front of the Room
- Have a Disaster Preparedness Plan



The Initial Preparation:



Challenge 4:

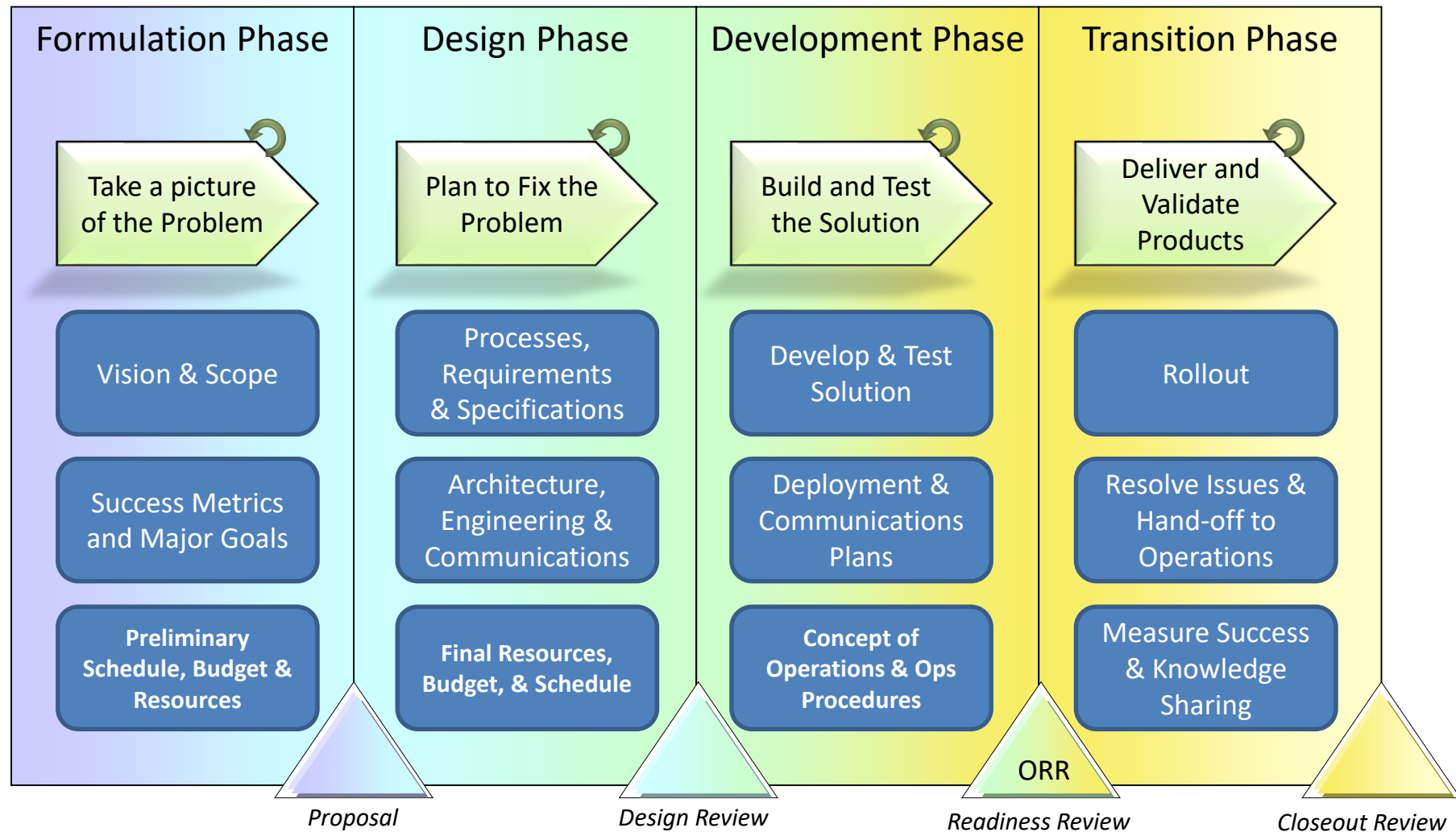
Working as a Team

Mapping a Meta Process

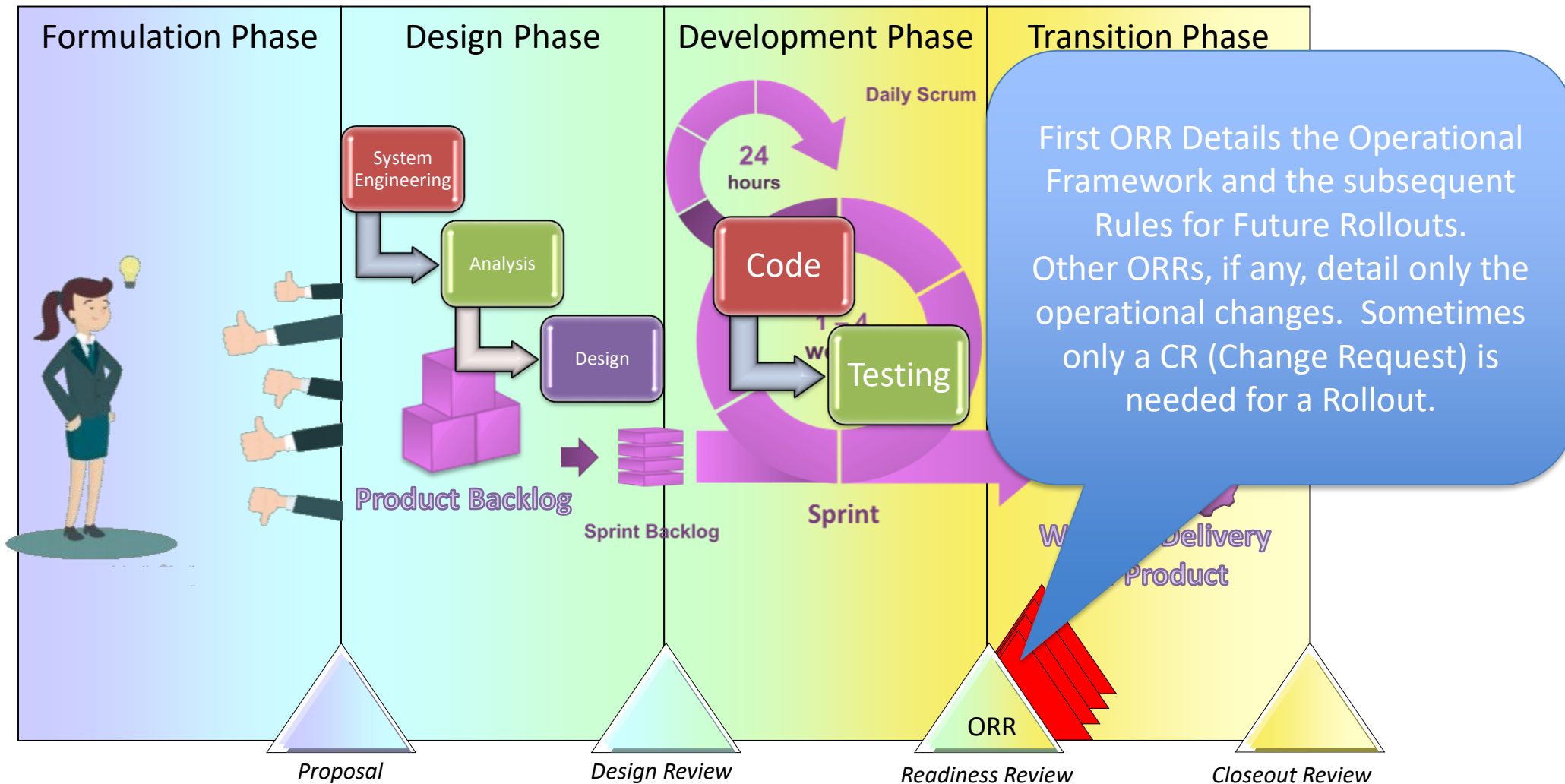
“Good people with a good process will outperform good people with no process every time” – Grady Booch, IBM

A Process needs only to provide a clear, universal language for expressing state and activity towards common goals

JPL's UP Framework



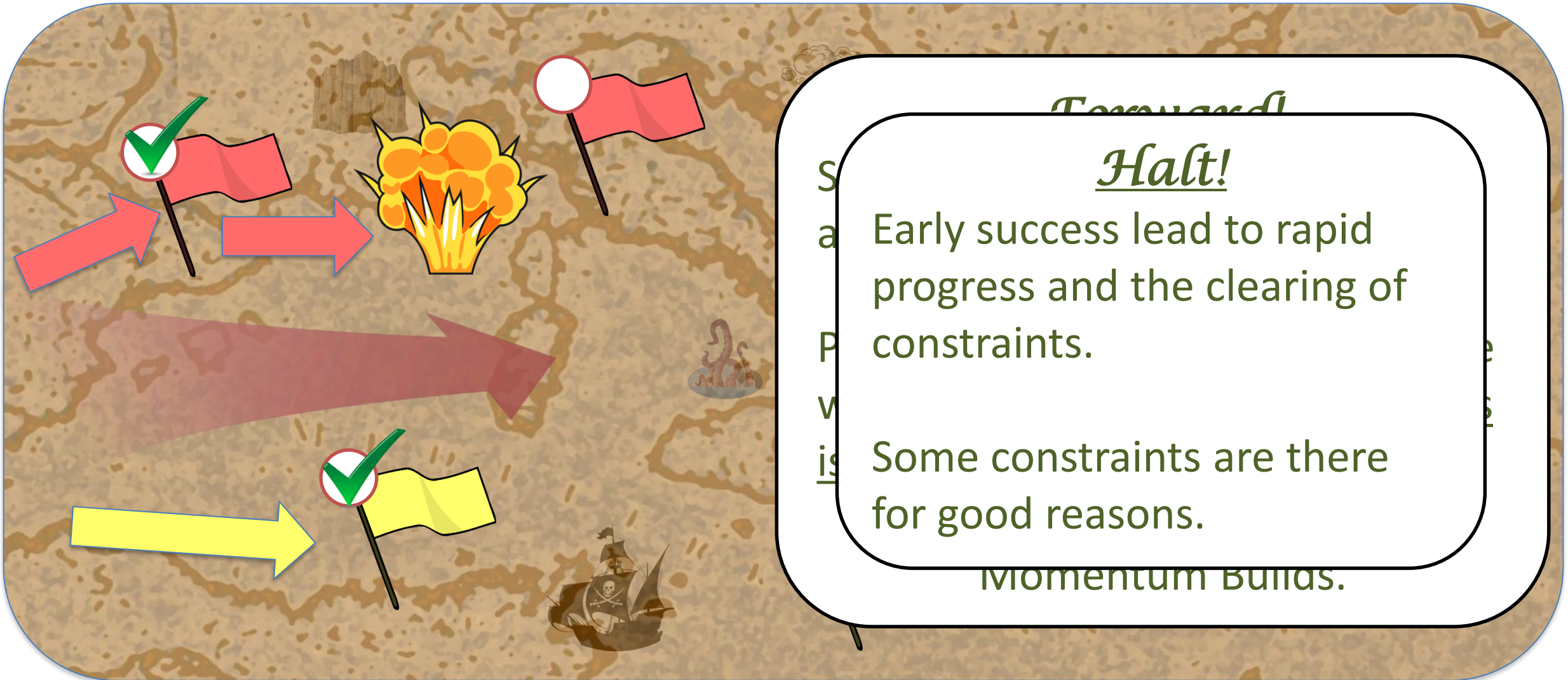
JPL's UP Framework



The Initial Preparation:



First Deliveries



First Real Setback

Setup for a Setback:

- Eager assistance from outside the team
- A wave of support from management
- An overconfident project team

All lead to less scrutiny of existing processes – and a potentially disastrous mistake



Attacks and Recovery

- Competitors and Detractors Appear:
 - Managers scramble to reclaim resources (people and dollars) from the program
 - Other promote their pet projects as alternatives
 - After-Action Reviews cost time, political capital, and morale

Throw us to the wolves

And we'll come back leading the pack!

Attacks and Recovery

- Rebuild Trust by Accelerating
 - Launch new initiatives (scope increase) to satisfy immediate sponsor needs
 - Package ready-made deliveries to also increase the visibility of success
 - Extra work keeps the team engaged and ends poaching attempts
 - More deliverables mean more morale builders for the team



Running with the

Hybrid Cloud Program

-  Private Cloud
-  **Orchestration**
-  **Automation**
-  Cloud Marketplace
-  Mission to Europa

Progress Report!

Project is delivering ahead of schedule and below expected costs – and this includes targets of opportunity!

Requests to join the program team are at a high-point

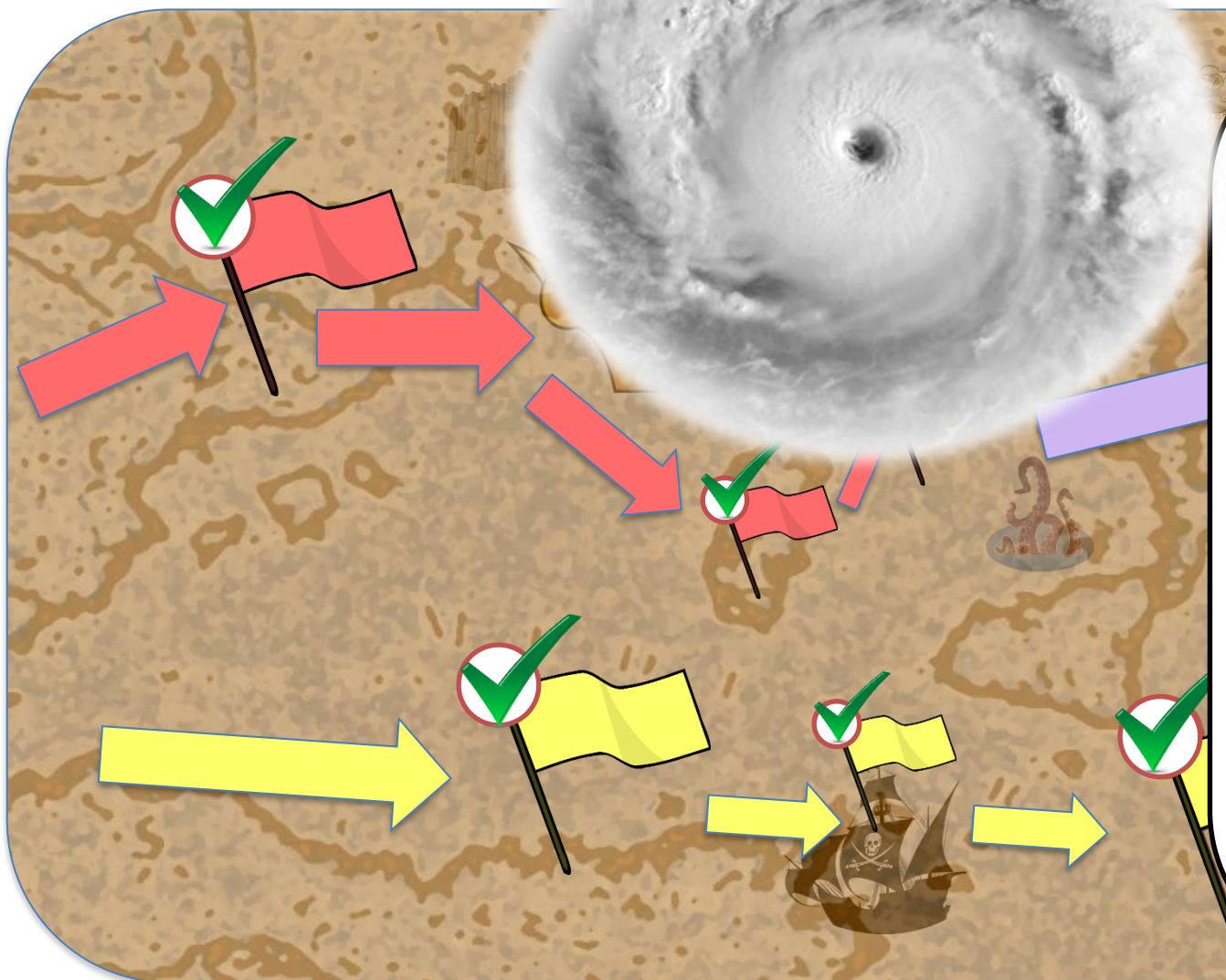
Smiling and Signing Autographs

- Making others dependent on your success:
 - Despite other managers disparaging remarks, the team is inundated with requests to join. People want to be a part of the journey!
 - This is not only because of the team's moral and energy – it was strategic
 - Tools that were needed by the cloud team were designed to be broader and more versatile than the team needed.
 - In addition to our customers, we invited areas we were dependent on to be pilot users and beneficiaries.
 - Now our dependencies were dependent on us and vested in our success.

The High Point



The White Squall



Disaster!

*On April Fools' Day!
our Private Cloud
vendor declared
bankruptcy and closed
their doors - destroying
the cornerstone of the
program.*

Consequences

Morale

- How to keep the team's momentum?

Technical

- How to achieve the Goals?

Logistical

- How to adjust schedule and budget?

Political

- How to deal with those who expected or desired failure?

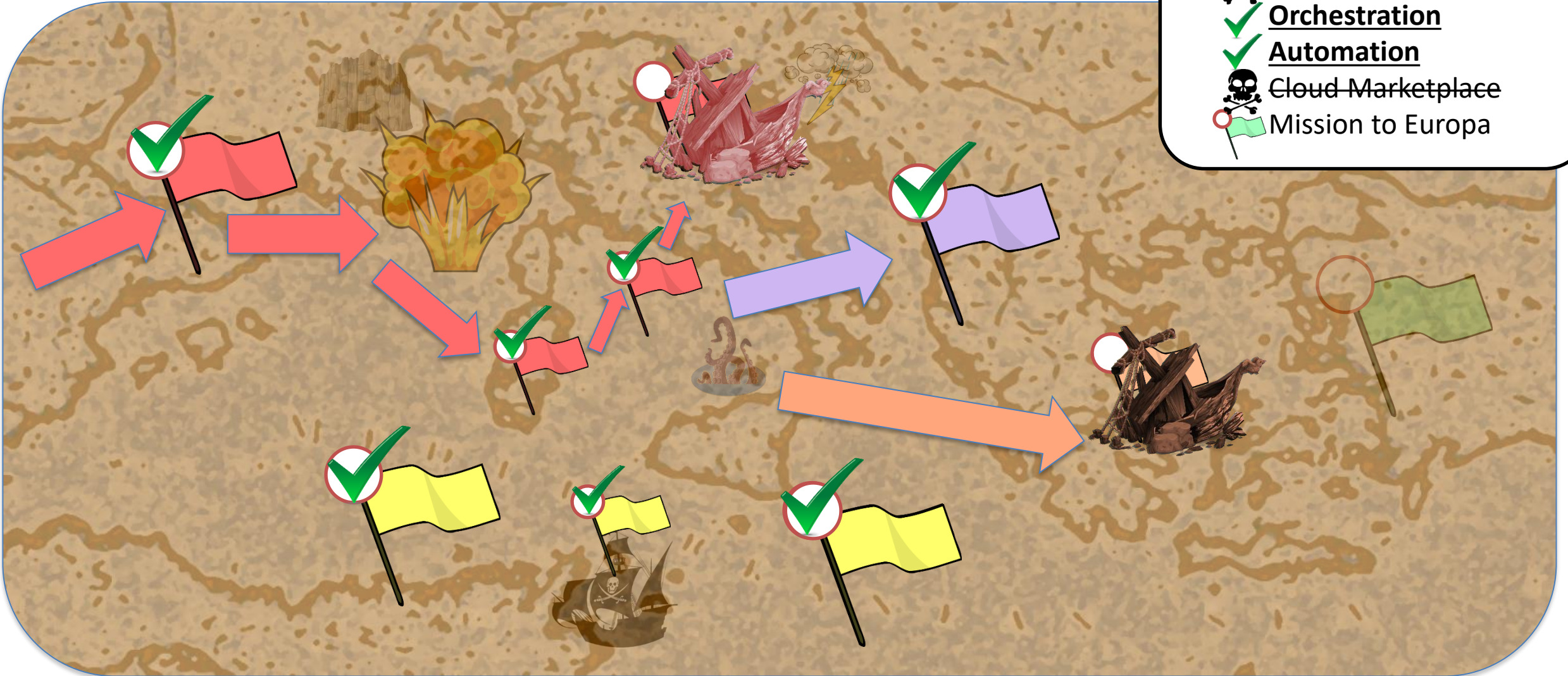
Affects of Failure



Disaster Stri

Hybrid Cloud Program

-  ~~Private-Cloud~~
-  Orchestration
-  Automation
-  ~~Cloud-Marketplace~~
-  Mission to Europa



Consequences

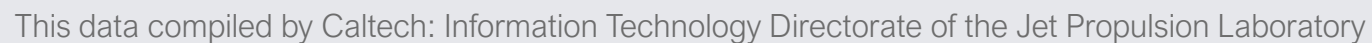
- Red Project Gone!
 - The chosen Private Cloud solution is no longer viable.
- Orange Project Gone!
 - The “On-line Store” providing access to pre-configured servers and farms is now the victim of lost schedule – but more importantly – lost resources and political capital.
- The freight-train of a program has come to a stop and people are raiding the cars.
- Other teams push competing solutions and we lose many of our sponsors. We even lose our team headquarters!

Recover & Regroup

- Remember: Each Project had a **dedicated disaster recovery plan**
 - Especially where there are so many of eggs in one basket
- **New Partners Identified** (hint: they already had been!)
- Leveraging team skills developed just over the past 9 months
- Salvaging the resources and hardware from the previous failure
- Other program teams quickly decoupled and re-routed
- Quickly Deliver new Pilots and solutions to sponsors

The Team Rises from the Ashes

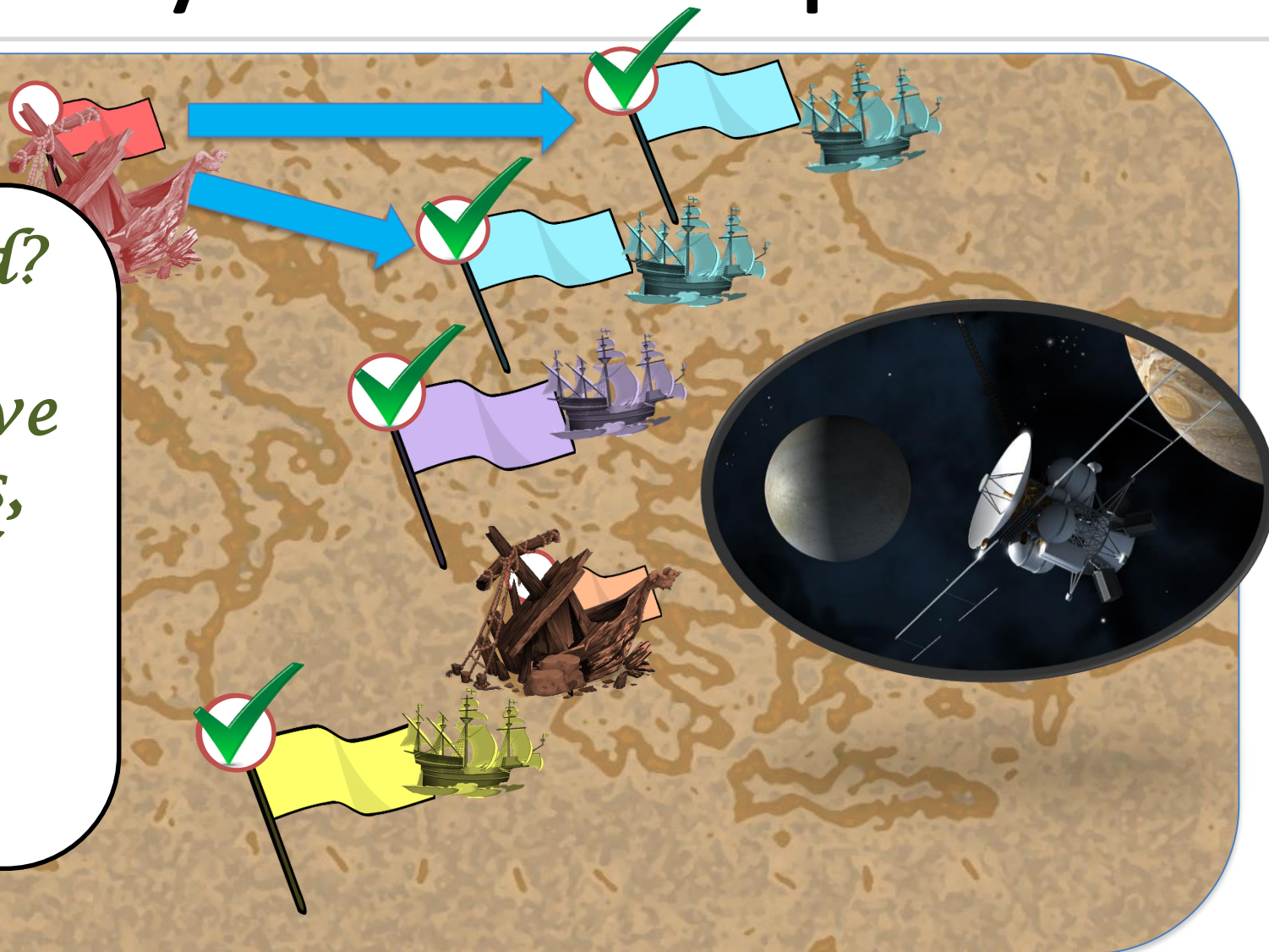




Delivery to Prime Sponsor

Mission Accomplished?

*With vendors that have
a stake in our success,
we deliver the final
components to the
Program...*



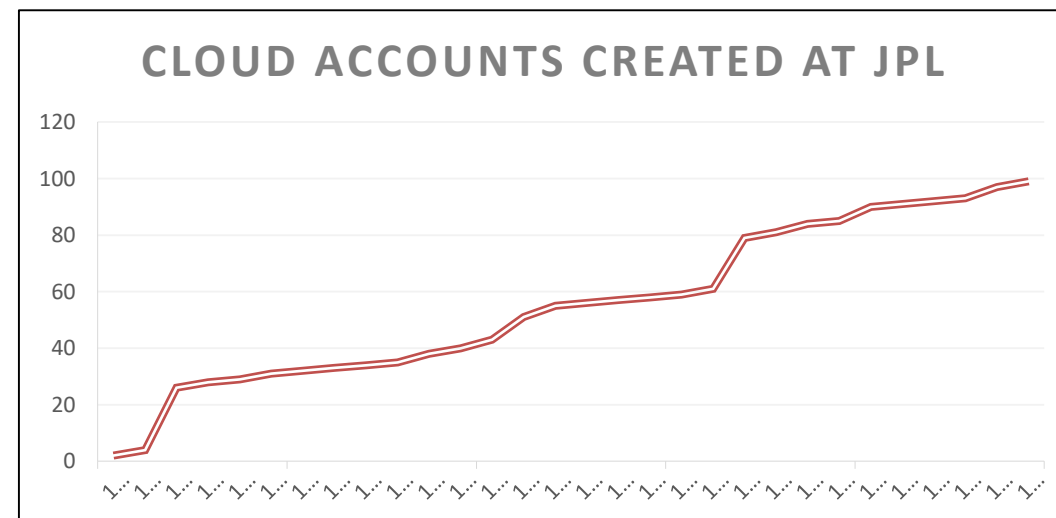
Summary

- Processes Exist to benefit humans!
- Assuring your team is functional is just as important as ensuring your schedule or budget is green
- Embedding processes that benefit the team dynamics is crucial to ensuring great teams
- Be a Project Prepper! Always have a Disaster Recovery Plan
- Take care of your team and they will take care of your project (and take care of you!)

**Processes cannot avoid all disaster, but
a strong team can weather any storm!**

Two Years Later...

- Upgrades to the Hybrid Cloud are now a critical component to JPL's infrastructure.
- The lead architect has moved to an executive position with a Fortune 50 company.
- One of the PMs is now the head of the IT PMO.
- Adoption of Cloud by JPL Missions is rocketing upwards.
- The team won many awards including the NASA Team Award for their accomplishments and contributions.



Thank You

- Presentation by:
 - Michael Stefanini, JPL
 - Senior Engineer and Associate CTO for IT
 - Manager of the IT Engineering and Project Management Office
 - **Manager of JPL Cloud Services**

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